

# EXHIBIT 3



# POLYETHYLENEGLYCOL MONOSTEARATE

## PRODUCT IDENTIFICATION

CAS NO 9004-99-3

EINECS NO.

FORMULA  $C_{17}H_{35}COCO(CH_2CH_2O)_n$

MOL WT.

H.S. CODE

TOXICITY

SYNOMYS polyglycol monostearate;

Oxyethylenated stearyl alcohol; POE monostearate; POE monostearate ether;

Polyoxyethylene monostearyl ether; Poly(oxyethylene) monostearate; Polyethylene glycol mono-octadecyl ether;

DERIVATION

CLASSIFICATION SURFACTANT

## PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE light amber semisolid

MELTING POINT

BOILING POINT

SPECIFIC GRAVITY

SOLUBILITY IN WATER Dispersible

pH

VAPOR DENSITY

REFRACTIVE INDEX

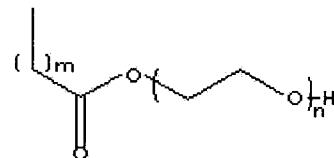
NFPA RATINGS Health: 1; Flammability: 1; Reactivity: 0

FLASH POINT

STABILITY Stable under ordinary conditions

APPLICATIONS

Polyethylene glycol is a condensation polymers of ethylene oxide and water with the general formula  $H(OCH_2CH_2)_nOH$ , where  $n$  is the average number of repeating oxyethylene groups typically from 4 to about 180. The low molecular weight members from  $n=2$  to  $n=4$  are diethylene glycol, triethylene glycol and tetraethylene glycol respectively, which are produced as pure compounds. The low molecular weight compounds upto 700 are colorless, odorless viscous liquids with a freezing point from -10 C (diethylene glycol), while polymerized compounds with higher molecular weight than 1,000 are waxlike solids with melting point upto 67 C for  $n=180$ . The abbreviation (PEG) is termed in combination with a numeric suffix which indicates the average molecular weights. One common feature of PEG appears to be the water-soluble. It is soluble also in many organic solvents including aromatic hydrocarbons (not aliphatics). They are used to make emulsifying agents and detergents, and as plasticizers, humectants, and water-soluble textile lubricants. Polyethylene glycol is non-toxic, odorless, neutral, lubricating, nonvolatile and nonirritating and is used in a variety of pharmaceuticals and in medications as a solvent, dispensing agent, ointment and suppository bases, vehicle, and tablet excipient. Lipophilic compounds are ethoxylated ethylene oxide (the monomer of polyglycols) so that the target compounds have hydrophilic (soluble in water). The bifunctionality in one molecule provides the basic properties of surfactants. Fatty acids rather lipophilic (or hydrophobic) exhibiting low HLB (Hydrophilic-Lipophilic Balance) values; having an affinity for, tending to combine with, or capable of dissolving in lipids (or water-insoluble). While, the ethoxylated fatty acids are hydrophilics exhibiting high HLB values; having an affinity for water; readily absorbing or dissolving in water. The type of fatty acid and the mole number of ethylene oxide provides diverse HLB values for proper applications. There are almost infinite ethoxylated compounds. In



combination with the average molecular weights and water-soluble property of PEG, the wide range of chain lengths of fatty acids provide identical physical and chemical properties for the proper application selections directly or indirectly.

- HLB numbers describe following characteristics:
- <10 : Lipid soluble (or water-insoluble)
- >10 : Water Soluble
- 4-8 : Antifoaming
- 7-11 : Water-in-oil emulsion
- 12-16 : Oil-in-water emulsion
- 11-14 : Good Wetting
- 12-15 : Good detergency
- 16-20 : Stabilizing
- HLB values of fatty acid compounds are:

Polyethylene Glycol (PEG) Esters are non-toxic and non-irritating nonionic emulsifiers. They are prepared by the esterification of fatty acids with polyethylene glycols. The low molecular weight ranging PEG Esters are oil-soluble to work in nonaqueous systems. The high molecular esters are water-soluble can be used in aqueous systems. Polyethylene Glycol Esters are used as emulsifiers and in formulating emulsifier blends, thickener, resin plasticizer, emollient, opacifier, spreading agent, wetting and dispersing agent, and viscosity control agents. They also have application in the metalworking, pulp, paper, textile and as defoamers for latex paints.

#### SALES SPECIFICATION

##### PEG 200 MS

APPEARANCE	light amber semisolid
MELTING POINT	30 C
ACID VALUE	5 max
SAP VALUE	120 - 130
SPECIFIC GRAVITY	0.935 ± 0.010
CLOUD POINT (1% H <sub>2</sub> O)	< 5 C
APPRX HLB	8.1

##### PEG 400 MS

APPEARANCE	light amber semisolid
MELTING POINT	33 C
ACID VALUE	5 max
SAP VALUE	85 - 95
SPECIFIC GRAVITY	0.975 ± 0.010
CLOUD POINT (1% H <sub>2</sub> O)	< 5 C
APPRX HLB	11.5

##### PEG 600 MS

APPEARANCE	light amber semisolid
MELTING POINT	37 C
ACID VALUE	5 max
SAP VALUE	60 - 70
SPECIFIC GRAVITY	1.000 ± 0.010
CLOUD POINT (1% H <sub>2</sub> O)	< 55 C

##### APPRX HLB

##### PEG 1000 MS

APPEARANCE	light amber solid
MELTING POINT	42 C

ACID VALUE	5 max
SAP VALUE	40 - 50
SPECIFIC GRAVITY	1.030 $\pm$ 0.010
CLOUD POINT (1% H <sub>2</sub> O)	> 90 C
APPRX HLB	15.5
PEG 4000 MS	
APPEARANCE	light amber solid
MELTING POINT	57 C
ACID VALUE	5 max
SAP VALUE	10 - 20
SPECIFIC GRAVITY	1.075 $\pm$ 0.010
CLOUD POINT (1% H <sub>2</sub> O)	> 100 C
APPRX HLB	18.5
PEG 6000 MS	
APPEARANCE	light amber solid
MELTING POINT	62 C
ACID VALUE	5 max
SAP VALUE	5 - 15
SPECIFIC GRAVITY	1.080 $\pm$ 0.010
CLOUD POINT (1% H <sub>2</sub> O)	> 100 C
APPRX HLB	19.0
TRANSPORTATION	
PACKING	
HAZARD CLASS	
UN NO.	
OTHER INFORMATION	

---

[Offer To Sell](#) [Offer To Buy](#) [Information](#) [Search](#) [Fax](#)